

REMARKS

A final Office Action was mailed on May 14, 2004. Claims 1 – 9 are currently pending in the application. Applicants thank Examiner Cunningham for holding an interview with Applicants' representative on August 10, 2004 to discuss the present claims. In response to the discussion, Applicants presently propose revisions FIGs. 10A and 10B, amend claims 1, 3, 5, 7, 8 and 9 to further clarify the nature of their invention, and file the present Amendment concurrently with a Request for Continued Examination (RCE). No new matter is introduced.

PROPOSED REVISION TO DRAWING

Applicants propose revisions to FIGs. 10A and 10B to indicate that each of these figures represents the prior art. Applicants' proposed revisions are provided in replacement drawing sheets, including clean and marked-up versions. Accordingly, Applicants respectfully request that the proposed revisions to FIGs. 10A and 10B be accepted.

REJECTION UNDER 35 U.S.C. § 102

Claims 1 - 9 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,255,252 to Falk. Applicants amend independent claims 1, 3, 5, and 7 - 9 to further clarify the nature of their invention, and respectfully traverse this rejection

In a Response of February 24, 2004, Applicants made the following arguments:

Applicants disclose a method, apparatus and program medium for rendering a texture onto a surface of a three-dimensional object model. Applicant's claimed method includes the steps of: a) dividing texture data into a plurality of texture lines each having a width of one dot, b) constructing a stereoscopic object, based on the plurality of texture lines, by projecting an image of each texture line as defined by a virtual light source together with associated color information, and c) defining an intersecting part between the stereoscopic object and the surface for rendering each texture line. In this manner, the object can be rendered using the shadow volume method to obtain a rendering that more accurately conforms to the three-dimensional surface.

As shown for example in Applicants' FIG. 7C, as an outcome of applying the shadow volume method to parallelepiped 540 formed from texture line 530, shadow color information for each dot of each texture line is stored in association with side surface 540a and a side surface opposite to side surface 540a (see, e.g., page 11, lines 1 – 17 of Applicants' specification). By rendering parallelepiped 540 only in write-allowed region 510 at the intersection of parallelepiped 540 and object 500, a projected image of texture line 530 is formed in the L-shaped region defined by write-allowed region 510.

Falk discloses a method for providing surface detail on a three-dimensional surface that preserves the dimensional integrity of the detail (see, e.g., abstract of Falk). The method of Falk allows for a two-dimensional "flattened" pattern to be computed in order to produce a desired two-dimensional design pattern on a three-dimensional surface (see, e.g., FIG. 2 of Falk). Falk discloses that the surface is approximated by a three-dimensional mesh used to compute a two-dimensional flattened pattern. However, unlike Applicants' claimed invention, Falk does not disclose or suggest further rendering each two-dimensional pattern as a series of texture lines by means of applying the shadow volume method to generate a projected image of each texture line on the three-dimensional surface. By using the shadow volume method to project individual texture lines onto the appropriate three-dimensional surfaces of object 500, Applicants' claimed method produce a rendering that far more accurately depicts the image as a composite image composed of individual projections for each of the texture lines (see, e.g., Applicants' FIGs. 7B - 7E).

The Examiner found these arguments to be unpersuasive, in part suggesting that the portions of the arguments pertaining to "shadow volume" and "series of texture lines" were not supported by corresponding limitations in the claims. Applicants once again thank Examiner Cunningham for discussing the present Office Action in further detail with Applicants' representative. Applicants amend independent claims 1, 3, 5, and 7 – 9 the means by which texture data is rendered on a three-dimensional model by means of the shadow volume method, representatively illustrated by the amendments to claim 1:

1. A method for rendering a texture onto a surface of ~~an~~ a first object model represented by a three-dimensional model, comprising:

dividing texture data into a plurality of texture lines each having a width of one dot and a length equal to the number of dots in one side of the texture;

preparing a plurality of second three-dimensional object models, each second model based on one of said plurality of texture lines, by projecting said one

texture line in a light traveling direction from a virtual light source while possessing color information by means of a shadow volume method, thereby forming a relationship between the texture line, the object model and the virtual light source in a three-dimensional space; and

defining an intersecting part between each second object and the surface of the first object model as a region for rendering the associated texture line, thereby rendering the texture data on the surface of the first object model.

Applicants' invention employs a shadow volume method, which has been conventionally used for projecting a shadow of one three-dimensional object model onto the surface of another three-dimensional object model, as a means for rendering texture data on the surface of a three-dimensional object model. Applicants enclose a reference that is generally descriptive of the shadow volume method, and will formally this reference in a subsequently-mailed Information Disclosure Statement.

As illustrated, for example, by Applicants' FIGs. 7C, 7D and 8, Applicants' inventive method divides texture data into a plurality of texture lines, and the shadow volume method is applied to each texture line separately to project the texture line in a light traveling direction from a virtual light source to form a one three-dimensional object model (for example, a rectangular parallelepiped object 140 as illustrated by FIG. 7C) that intersects another three dimensional object at a rendering surface of the other three-dimensional object (see, e.g., surface 510 of FIGs. 7C and 7D. A side surface 540a of the one three-dimensional model provides a means for extending color information represented by dots in the texture line to the intersecting surface 510 (see, e.g., page 10, line 16 through page 11, line 17 of Applicants' specification). By repeating this process for each of the plurality of texture lines, the texture is effectively positioned on the rendering surface of the other three-dimensional object (see, e.g., Applicants' FIG. 7E. This advantage provide the benefit of simplifying the process for accurately representing textures on three-dimensional object models over prior art methods.

As outlined above, Falk discloses a method for providing surface detail on a three-dimensional surface that preserves the dimensional integrity of the detail (see, e.g., abstract of Falk). The method of Falk allows for a two-dimensional “flattened” pattern to be computed in order to position a desired two-dimensional design pattern on the computer flattened pattern, and then projecting the two-dimensional design pattern from the computer flattened pattern onto a three-dimensional surface (see, e.g., FIG. 2 of Falk).

Falk discloses that the surface is approximated by a three-dimensional mesh use to compute a two-dimensional flattened pattern. Unlike Applicants’ claimed invention, Falk does not disclose or suggest further rendering each two-dimensional pattern as a series of texture lines by means of applying the shadow volume method to generate a projected image of each texture line on the three-dimensional surface. Morevoer, while Applicants’ method provides a means for rendering a pattern by creating two three-dimensional objects and calculating their intersecting surfaces, Falk discloses a rendering method that requires a three-dimensional object model to first be transformed into a two-dimensional mesh, which is subsequently transformed back to the three-dimensional object model after the texture ahs been positioned on the two-dimensional mesh. Arguably, Applicants’ method enjoys an advantage in requiring fewer transformative steps than the method of Falk, and is therefore computationally simpler than Falk

Accordingly, Applicants respectfully submit that independent claims 1, 3, 5, and 7 - 9 are not anticipated by Falk, and are therefore allowable. As claims 2, 4 and 6 depend from allowable claims 1, 3 and 5, Applicants further submit that claims 2, 4 and 6 are also allowable for at least this reason.

CONCLUSION

An earnest effort has been made to be fully responsive to the Examiner's objections. In view of the above amendments and remarks, it is believed that claims 1 - 9, consisting of independent claims independent claims 1, 3, 5, and 7 – 9, and the claims dependent therefrom, are in condition for allowance. Passage of this case to allowance is earnestly solicited. However, if for any reason the Examiner should consider this application not to be in condition for allowance, he is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged on Deposit Account 50-1290.

Respectfully submitted,



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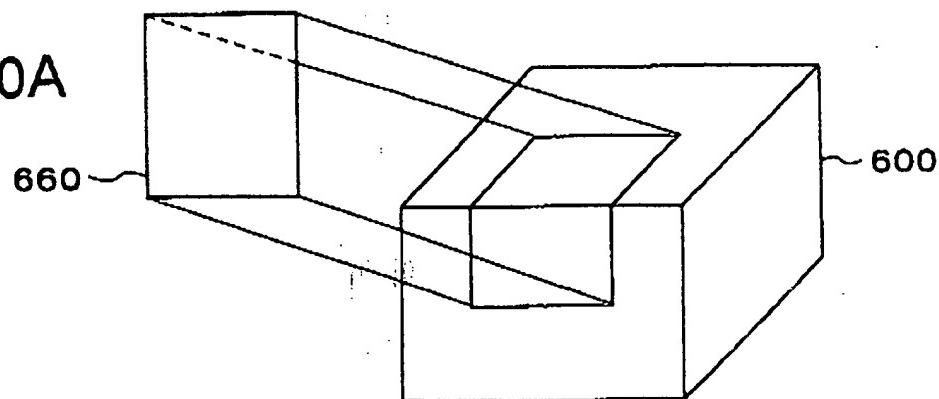
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Docket No: SCET 19.177(100809-00090)
TJB:pm



(REPLACEMENT PAGE)

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FIG.10A



PRIOR ART

FIG.10B

PRIOR ART

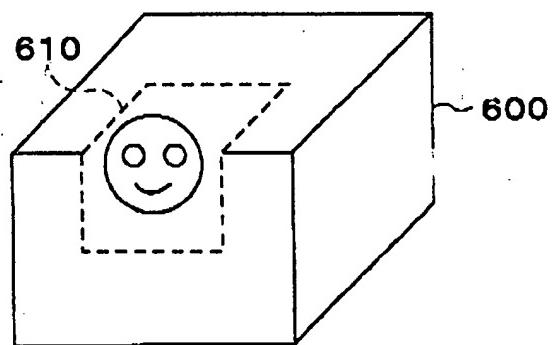
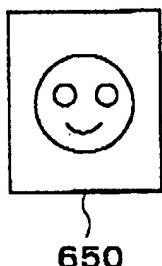
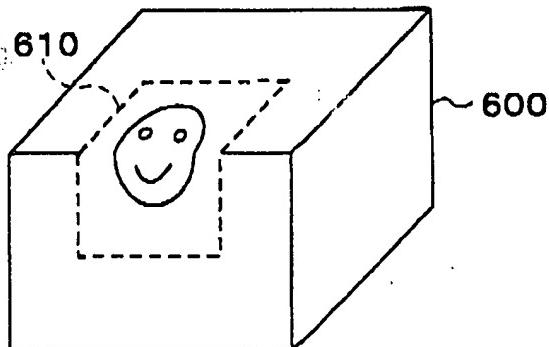


FIG.10C



(REPLACEMENT SHEET)



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FIG.10A

Prior Art

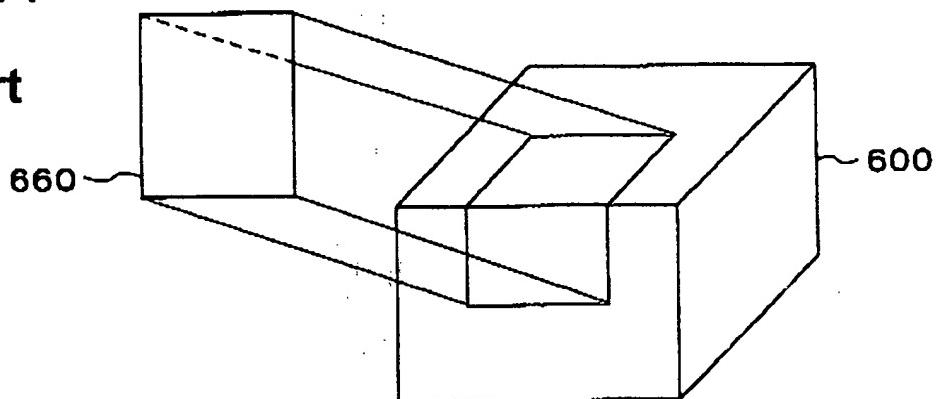


FIG.10B

Prior Art

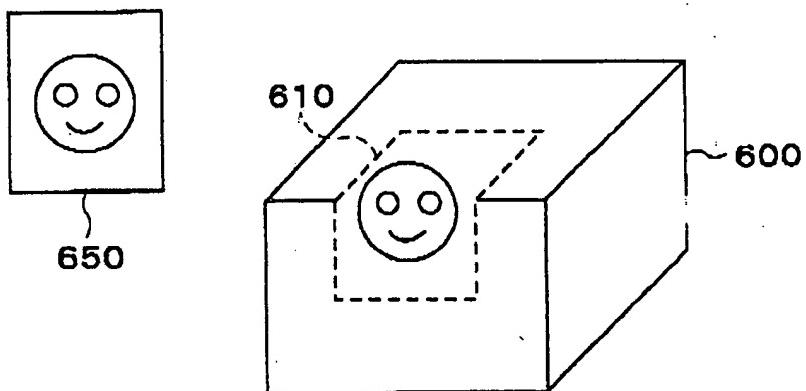


FIG.10C

